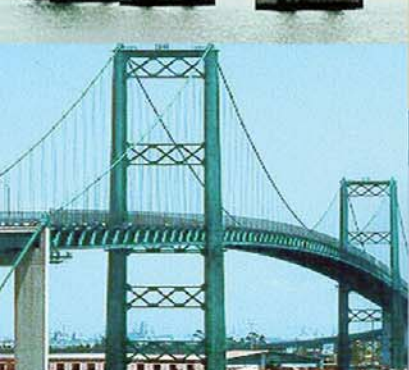


COST REVIEW

REPORT



Prepared for:

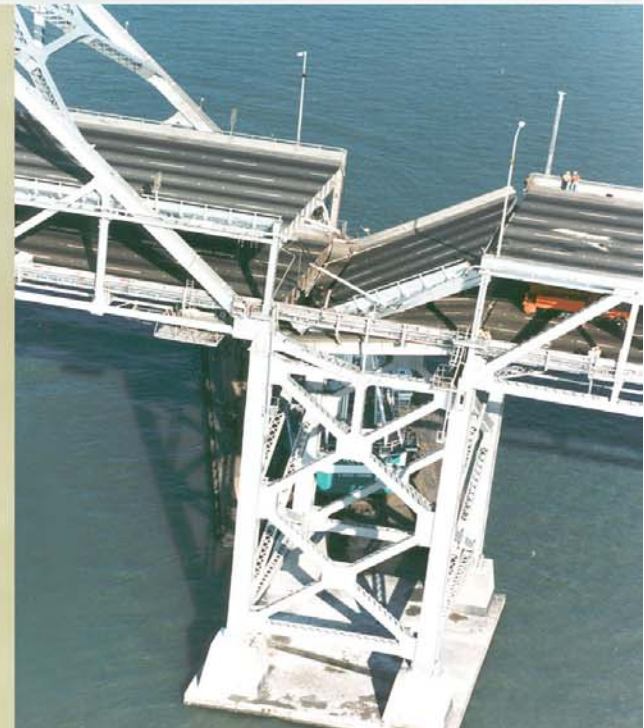


Bay Area Toll Authority

Prepared by:



Bechtel Infrastructure Corporation



AUGUST 2004

Bay Area Toll Authority Commission

Commission Roster

Steve Kinsey, MTC Chair
Marin County

Jon Rubin, MTC Vice Chair
San Francisco Mayor's Appointee

Tom Ammiano
City and County of San Francisco

Irma L. Anderson
Cities of Contra Costa County

Tom Azumbrado
U.S. Department of Housing and Urban Development

James T. Beall Jr.
Santa Clara County

Mark DeSaulnier
Contra Costa County

Bill Dodd
Napa County

Dorene M. Giacobini
U.S. Department of Transportation

Scott Haggerty
Alameda County

Barbara Kaufman
San Francisco Bay Conservation
and Development Commission

Sue Lempert
Cities of San Mateo County

John McLemore
Cities of Santa Clara County

Michael D. Nevin
San Mateo County

Bijan Sartipi
State Business, Transportation and Housing Agency

James P. Spering
Solano County and Cities

Pamela Torliatt
Association of Bay Area Governments

Sharon Wright
Sonoma County and Cities

Shelia Young
Cities of Alameda County

Management Staff

Executive Director
Steve Heminger

Deputy Director, Operations
Ann Flemer

Deputy Director, Policy
Therese McMillan

General Counsel
Francis Chin

Chief Financial Officer
Brian Mayhew

Manager of Bridge and Highway Operations
Rod McMillan

The information contained in this report is for BATA use only. It will not constitute part of a prospectus, offering circular or other financing document or be offered to any third party involved in the preparation or review of any prospectus, offering circular or other financing document and in support of any final financial decisions.

COST REVIEW REPORT



Prepared for:



Bay Area Toll Authority

AUGUST 2004

Prepared by:



Bechtel Infrastructure Corporation

Table of Contents

Section	Page
Introduction and Organization	1
Purpose of the Review	1
Scope of Review	1
Approach	2
Stage of Project Development.....	2
Relative Construction Value of the Bridges.....	3
Cost Review Priorities	5
Richmond-San Rafael Bridge	5
San Francisco-Oakland Bay Bridge West Approach	6
San Francisco-Oakland Bay Bridge East Span.....	6
Escalation.....	8
Capital Outlay Support	9
Contingency	9
Basis of the Cost Review	10
Qualifications of the Cost Review	10
Results	11
Conclusion	14
Appendix 1: Schedule	15
Appendix 2: SAS Options Review	17
Appendix 3: Cost Review Forecast Comparison with Caltrans' Forecast	26
Attachments	27

Table

Table 1	Caltrans' Program-Level Cost Forecast	12
Table 2	Caltrans' Project-Level Cost Forecast.....	13

INTRODUCTION AND ORGANIZATION

In June 2004, the Bay Area Toll Authority (BATA) requested that Bechtel Infrastructure Corporation (BINFRA) perform a cost review of the current Caltrans cost estimate of the Toll Bridge Seismic Retrofit Program (TBSRP). This report presents the findings of the cost review, and is organized into the following sections:

- Introduction and Organization
- Purpose of the Cost Review
- Scope of Review
- Approach
- Basis of the Cost Review
- Qualifications of the Cost Review
- Results and Findings
- Conclusion

PURPOSE OF THE REVIEW

The purpose of this effort is to review the reasonableness of the current Caltrans cost forecast for the TBSRP.

SCOPE OF REVIEW

The TBSRP is a bridge rehabilitation program to strengthen or replace seven (7) state-owned toll bridges to improve their performance in the event of a significant earthquake. The bridges in this program are:

- Richmond-San Rafael Bridge
- San Francisco-Oakland Bay Bridge
- Benicia-Martinez Bridge
- Carquinez Bridge
- San Mateo-Hayward Bridge
- Vincent Thomas Bridge
- San Diego-Coronado Bridge

APPROACH

Within the limited time available (approximately 5 weeks), the cost review was undertaken as a joint Caltrans/Bechtel effort through workshops comprised of Caltrans and Bechtel personnel, and was performed as a trend analysis of the individual project contracts. The approach was influenced by the stage of project development and the relative construction value for each bridge or bridge project, as described below.

The cost review was based on the stated construction period in the current Caltrans SFOBB East Span Replacement schedule wherein the Self-Anchored Suspension Bridge (SAS) contract is awarded in August 2004 and both directions of the East Span Replacement are open to traffic by December 2010.

Stage of Project Development

The TBSRP project contracts were grouped into three categories for the purpose of the cost review. These categories are:

1. **Completed Projects** – Work awarded by Caltrans that was complete or nearly complete. This category includes the Benicia-Martinez Bridge, the Carquinez Bridge, the San Mateo-Hayward Bridge, the San Diego-Coronado Bridge, the Vincent Thomas Bridge, the SFOBB West Span, and Pier W2 of the SAS Bridge on the SFOBB East Span.

In general, the review of these contracts consisted of a cursory overview examination of the costs expended to date, which were provided by Caltrans, as well as an evaluation of anticipated costs to be expended. Where applicable, the support costs were also reviewed to confirm that sufficient costs were forecast to close the contracts.

2. **Work in Progress/Bids Received** – Work awarded by Caltrans that had a percentage of contract work remaining to be completed. This category includes the Richmond-San Rafael Bridge, the SFOBB West Approach, and the Skyway, Pier E2/Tower T1 Footing of the SAS, the SAS superstructure, and the south detour projects of the SFOBB East Span Replacement.

The review of these contracts focused on pending and potential change orders and claims, possible schedule extensions or delays, and escalation, together with a review of the Caltrans support costs.

3. **Future Work** – Work planned by Caltrans that has not yet been bid. This category includes the Yerba Buena Island (YBI) transition structure, the Oakland Touchdown, and the demolition of the existing SFOBB as part of the East Span Replacement.

The review of these contracts focused on Caltrans' estimates of the unawarded work, potential contract growth for the not-yet-awarded work, and estimates of future support costs.

The work covered by categories 2 and 3 comprised the majority of the cost review effort conducted by Bechtel in collaboration with Caltrans, as these projects had the maximum exposure to possible variance from the cost forecast and the largest absolute costs.

In the Caltrans/Bechtel workshops, the cost review team reviewed Caltrans' contract cost and schedule documents used as the forecast basis, as well as Caltrans' methodology of arriving at its forecast. The team performed a pricing validation on yet-to-be-awarded work, making adjustments as necessary. Following the pricing review, adjustments were made based on Caltrans' historical cost and schedule experience, potential extensions or delays, and escalation. Support costs were evaluated in relation to each project's contract construction costs and schedule. After overall review of the project contracts, the team performed a cost risk analysis and a schedule risk analysis and evaluated contingency for the program.

Relative Construction Value of the Bridges

Due to the limited time allowed for the cost review, the team focused on work with the largest potential to impact the TBSRP cost as currently forecast by Caltrans.

A review of the project contracts led to the categorization and prioritization of the bridges and program-wide issues, as shown below.

Richmond-San Rafael Bridge

Contract: 0438U Bridge Retrofit

Status: Expected construction completion in June 2005; work is approximately 80% complete

Priority of Evaluation: High

San Francisco-Oakland Bay Bridge-West Span

Contracts: 04353 Project 11
04354 Project 15
04355 Project 16
04347 Project 19
0434L Project 20

Status: All work is complete

Priority of Evaluation: Low

Contract: 0435U Project 18

Status: Expected construction completion in June 2004; work is approximately 99% complete

Priority of Evaluation: Medium

San Francisco-Oakland Bay Bridge-West Approach

Contract:	0435C TTT Loop & 4 th Street On Ramp	Status: All work is complete Priority of Evaluation: Low
Contract:	0435F "East" Loop	Status: In conceptual design Priority of Evaluation: Low (Small Project)
Contract:	0435V West Approach	Status: Construction commenced in June 2003; work is approximately 20% complete Priority of Evaluation: High

San Francisco-Oakland Bay Bridge-East Span

Contracts:	01205 Oakland Touchdown Surcharge 01207 YBI Archaeology 01208 Pile Demonstration 04300 Interim East Bay Retrofit 04343 East Bay Approach Piers E23-29	Status: All work is complete Priority of Evaluation: Low
Contracts:	0120Q USCG Road Relocation 0120C SAS Pier W2 0220G YBI Substation	Status: Work is virtually complete Priority of Evaluation: Medium
Contracts:	0120E SAS Pier E2/Tower 1 0120R South Detour 01202 Skyway	Status: Construction is in progress Priority of Evaluation: High
Contracts:	0120F Self-Anchored Suspension Bridge	Status: Bid received. Award scheduled for August 2004. Priority of Evaluation: High
Contracts:	01204 Oakland Touchdown 01209 Existing Bridge Demolition 0120P YBI Transition Structures	Status: In various stages of design Priority of Evaluation: High
Contract:	0120J Storm Water Mitigation	Status: Conceptual scope only Priority of Evaluation: Low (Small Project)

Benicia-Martinez Bridge

Contracts:	04402 Approaches Retrofit 0440U Bridge Retrofit 13341 Mococco Overhead	Status: All work is complete Priority of Evaluation: Low
-------------------	--	---

Carquinez Bridge

Contract:	04393 1958 Bridge Retrofit	Status: All work is complete Priority of Evaluation: Low
------------------	----------------------------	---

San Mateo-Hayward Bridge

Contracts:	04362 Existing Trestle 04363 West Approach, Pier 1 0436V High-rise 04368 Mitigation Planting	Status: All work is complete Priority of Evaluation: Low
-------------------	---	---

Vincent Thomas Bridge

Contract: 1381U Main Span and Approaches

Status: All work is complete

Priority of Evaluation: Low

San Diego-Coronado Bridge

Contracts: 02191 }
02192 } Main Structure
02193 } Tower
0219U } Foundation Piers 24-32

Status: All work is complete

Priority of Evaluation: Low

In addition to review of the capital costs affected by the contract/ design, the following items affecting the total costs of the TBSRP were also reviewed.

Capital Outlay Support

All active and unawarded contracts

Status: Major construction-related effort ongoing

Priority of Evaluation: High

Project Schedules

All active and unawarded contracts

Status: Start/complete construction dates are planned for all major contracts, except the demolition of the existing bridge (open to traffic for both directions of the SFOBB is planned for December 2010)

Priority of Evaluation: High

Escalation

All active and unawarded contracts

Status: Required for change of open to traffic for the SFOBB East Span Replacement from 2006 to 2010

Priority of Evaluation: High

Cost Review Priorities

Based on an evaluation of the potential for cost and cost/time impacts of each TBSRP project, the categorization and prioritization process resulted in the selection of the Richmond-San Rafael Bridge project, the SFOBB West Approach project, the SFOBB East Span Replacement project, and the program-wide issues of support, escalation, and contingency as the areas of focus for the cost review.

Richmond-San Rafael Bridge

This seismic retrofit contract includes retrofit to the truss foundations, piers, support frames, and superstructure, as well as replacement of the trestle on the western side. The contract was awarded in October 2000 with a contract completion of September 2004. Based on performance to date, completion is forecast for June 2005. In workshops with Caltrans personnel, the cost review team concentrated on the

validity of outstanding and unresolved change orders, as well as an evaluation of potential future change orders and delays to determine the potential final construction cost. The determinations from these workshops were incorporated into a program risk analysis model.

San Francisco-Oakland Bay Bridge West Approach

This is a “remove and replace” construction project in which temporary elevated roadway structures are constructed in a staged operation to maintain traffic flow while the existing elevated concrete structures are removed and replaced with new concrete structures.

The staging and “shoehorning” of foundations and structures required to maintain traffic flow on I-80 at all times imposes unusual constraints on the work, and positions costs above those associated with more common highway construction work.

Based on the performance to date, the project is forecast to complete on schedule in June 2008. In workshops with Caltrans personnel, the cost review team concentrated on the validity and rate of changes to date and the potential for future changes and delays, based on specific project knowledge. The determinations from these workshops were incorporated into a program risk analysis model.

San Francisco-Oakland Bay Bridge East Span

The SFOBB East Span Replacement project consists of a number of projects, namely the Oakland Touchdown, the Skyway, the piers and tower footing for the SAS bridge, the SAS superstructure, the transition structure at YBI, the south detour, and the demolition of the existing bridge. Each project is at a different stage of design-bid-construct. Workshops with Caltrans personnel were convened to review each project.

Oakland Touchdown

This contract on the eastern end of the SFOBB for the connection between the Skyway and the Toll Plaza includes roadwork, bridge piers and superstructure, and removal of a conflicting portion of the existing bridge. The contract is scheduled for award in January 2007 and completion in April 2012. In workshops, the cost review team reviewed the preliminary engineer’s estimate and adjustments were made for current pricing, escalation, and potential changes and delays based on Caltrans’ historical experience.

Skyway

This construction contract is for a new segmental, precast, prestressed, balanced cantilever bridge with parallel roadways supported on pile/pier foundations. The contract was awarded in January 2002 with a scheduled completion in February 2006. The current forecast completion is May 2007. Foundation piles are nearing completion; concrete pier construction and fabrication of the precast sections are progressing. In workshops, the cost review team evaluated the rate and validity of approved and pending changes, as well as potential future changes and delays based on Caltrans' historical experience with design and erection issues.

SAS Pier W2

This contract for the foundation and western pier of the SAS, located on the eastern edge of YBI, was forecast to complete in July 2004 at the time of this report's preparation. In workshops, the cost review team evaluated unresolved changes to assure that projected costs were adequate to effect contract closeout.

SAS Pier E2/T1

This contract for the foundation and eastern pier and the foundation and base of the SAS tower was awarded in April 2004 and is scheduled to complete in May 2007. The contractor plans to complete construction approximately 17 months early and to receive an early completion bonus. The foundation piles are underreamed to install rock sockets – an item that has been problematic on other Caltrans bridge projects in the San Francisco and adjoining bays. In workshops, the cost review team evaluated pending and potential changes and delays, including those related to steel pricing and Caltrans' historical experience with rock sockets.

SAS

A single bid was received on May 26, 2004 for the SAS structure. The bid is under review; the east span program schedule is based on award of this contract in August 2004. The Caltrans'-determined schedule for the SFOBB East Span Replacement provided the construction time frame upon which the cost review was based. Options for the SAS, including associated cost and schedule impacts, are discussed in Appendix 2.

In workshops, the cost review team used the current bid as the base and evaluated potential changes and delays based on Caltrans' historical experience.

YBI Transition

This contract is for construction of the transition structure from the new SAS, with two parallel roadways, to the YBI tunnel that has a roadway on each of two levels. The contract is scheduled for award in May 2006 and completion in April 2011. In workshops, the cost review team reviewed the preliminary engineer's estimate and made adjustments for current pricing and escalation as well as for potential changes and delays based on Caltrans' historical experience.

South Detour

This is a design-build contract for the temporary bridge structure between the YBI tunnel and the existing bridge, which will allow removal of a portion of the existing bridge for installation of the permanent YBI transition. The contract was awarded in March 2004 and is scheduled for completion in October 2005. In workshops, the cost review team evaluated the potential impact of current steel pricing and potential changes and delays.

Demolition of Existing East Span

This contract for demolition of the existing double-deck through-truss bridge is in the conceptual stage, with a planned start of physical field activity in early 2011 and completion within 24 months. In workshops, the cost review team members evaluated the engineer's estimate and potential changes for current market pricing, escalation, and delays.

As with the Richmond-San Rafael Bridge and the SFOBB West Approach, the determination from project workshops for the SFOBB East Span Replacement was incorporated into a program risk analysis model.

Escalation

Prior to the cost review team's escalation evaluation, all recently awarded and not-yet-awarded contracts were evaluated for current pricing, including the recent steep increase in steel pricing. For the escalation evaluation, work not yet performed – whether in awarded or not-yet-awarded contracts or engineer's estimates – was evaluated as to the applicability of future escalation. Where deemed appropriate for specific parts of the work, escalation at the rate of 5% per annum was included.

Capital Outlay Support

The Bechtel review team evaluated projected costs of Caltrans capital outlay support for each project on the basis of expenditures to date and staffing plans provided by Caltrans; projections of average current expenditures on the projects in progress; and Caltrans' historical cost experience. For completed projects, the expenditures to date were accepted as firm, acknowledging that further small expenditures could be incurred. For projects with a construction progress of one year or more, the projection of average expenditures to forecast construction completion or Caltrans' historical experience – a ratio of support cost to capital outlay cost – provided the best indicator of the potential final cost. For projects not yet awarded, Caltrans' historical cost and schedule experience was deemed the best indicator.

Contingency

This cost review undertaken by Bechtel in collaboration with Caltrans employed a “cost range” methodology to evaluate the probable range of costs for each project. This range was established by calculating “program contingency”. Contingency is an amount of money allowed for items within the defined scope of work that cannot be identified or foreseen but are likely to be encountered in the course of the work performance. Contingency allowances do not cover items outside the defined scope of work.

The Bechtel cost review team prepared a probabilistic risk analysis model using a Monte Carlo simulation program, common in the industry, to determine the range of contingency to be included in the total estimate. Significant components of each project, related to the work not yet completed and that could impact the outcome, were represented in the model. These components included cost and schedule items, such as contract work not completed; unawarded work; unresolved changes and claims; potential changes, claims, and delays; and escalation. These components are divided into terms and variables in the program depending on their exclusiveness or dependence.

Each term in the model was assigned a range of confidence (degree of certainty) corresponding to probability values of 10 percent, 25 percent, 50 percent, 75 percent, and 90 percent, with the higher percentage representing a higher confidence level. Additionally, variables, such as escalation, were assigned to applicable terms where a dependence or association exists. The Monte Carlo simulation method generates estimate values for each term, and therefore for each project and the total estimate. After 2,000 iterations are performed, a probabilistic outcome is developed for contingency development.

The risk analysis performed to assess the level of contingency appropriate for the TBSRP construction program provided a range of contingencies at various probabilities of underrun. An 80 percent probability was deemed appropriate to determine the amount of contingency to be included in the analysis (the contingency amount required to ensure an 80 percent likelihood that the estimate at project completion will not be exceeded). This 80 percent probability was used as the high end of the range; a 60 percent probability was used for the low end of the range. These probability factors led to the adoption of a contingency adjustment range used as part of the overall estimate range for each project.

In addition to the Monte Carlo simulation risk analysis performed for the construction costs, a schedule risk analysis was performed for the construction costs and a program contingency was applied to the total support costs. The schedule risk analysis was based on an evaluation of Caltrans' historical experience of schedule extensions. The contingency for support was evaluated as a potential for overrun.

BASIS OF THE COST REVIEW

This cost review is based on:

- Project plans and specifications provided by Caltrans for review and familiarization
- Project cost and schedule data provided by Caltrans, including the May 28, 2004 summary master schedule for the SFOBB East Span Replacement
- Joint Caltrans/Bechtel workshops to evaluate costs for each project
- Scheduled award of the SAS project in August 2004 with a scheduled December 2010 open-to-traffic date for both directions of the SFOBB East Span Replacement, and a scheduled start of the demolition of the existing bridge in early 2011 and completion within 24 months
- Review of selected major cost and risk elements (i.e., the review was limited to major change orders, key pricing drivers, and potential schedule delays)
- Spot checks made of selected items only for updated (current) pricing levels
- Contract change orders (CCO) and notice of potential claims (NOPC) logs for project elements under construction

QUALIFICATIONS OF THE COST REVIEW

- The cost review is a high-level trend analysis of the current Caltrans forecast cost of the TBSRP based on current contract bids and awards; expenditures to date; currently reported approved and unresolved

change orders and claims; potential future changes and claims including delays; preliminary engineer's estimates for future work; and current pricing and escalation adjustments. It is not a newly developed, detailed bottom-up estimate.

- The purpose of the July 2004 cost review was to review Caltrans' current 2004 cost forecast for reasonableness. The scope of the 2004 cost review did not include a detailed line-item comparison of the cost differences between AB1171 cost estimates and Caltrans' most recent forecast.
- The cost review is based on current documents provided by Caltrans. No value engineering analysis was performed on the design, and no allowances have been made for additional items of scope.
- Sunk and committed costs were not reviewed.
- The cost review assumes that the projects will be advertised and awarded at the times indicated in their current bidding schedule and completed as estimated in the "cost review schedule" (see Appendix 1). Should bidding and award of any of the new projects not occur as stated, an additional cost increase should be expected.
- This cost review excludes any impact due to Force Majeure events such as terrorists acts, major earthquakes, and work stoppages resulting from project funding issues.
- The information contained in this report is for BATA use only. It will not constitute part of a prospectus, offering circular or other financing document or be offered to any third party involved in the preparation or review of any prospectus, offering circular or other financing document and in support of any final financial decisions.
- This report is integral and must be read in its entirety. Because the work has been based on a review of estimates of others only, evaluations contained in this document should be considered preliminary in nature.
- The information on which these evaluations have been based was provided to Bechtel by BATA and Caltrans and, except where specifically stated otherwise, has not been independently verified. The evaluations contained in the cost review, therefore, may not be valid and costs may differ if other facts exist or if future facts or conditions differ from the assumptions on which this report and its evaluation are based.

RESULTS

Table 1 summarizes Caltrans' program-level cost forecast for the seven bridges in the program. Table 2 provides a more detailed segregation of Caltrans' forecasted final costs.

Table 1 Caltrans' Program-Level Cost Forecast (\$ Million)

Bridge Project	Caltrans Forecast July 2004
Completed Projects	
Benicia-Martinez Bridge	} \$624
Carquinez Bridge	
San Mateo-Hayward Bridge	
Vincent Thomas Bridge	
San Diego-Coronado Bridge	
Misc. Others	
Active Projects	
Richmond-San Rafael Bridge	\$914
San Francisco-Oakland Bay Bridge	\$5,867
Total Base Cost	\$7,405
Program Contingency	\$500 – \$900
Total Program Cost	\$7,905 – \$8,305

04038g3

Table 2 Caltrans' Project-Level Cost Forecast (\$ Million)

	Caltrans Forecast July 2004
Richmond-San Rafael Bridge	
Capital Outlay*	\$780
Capital Outlay Support	\$134
Richmond-San Rafael Bridge Total	\$914
SFOBB West Span	
Capital Outlay	\$233
Capital Outlay Support	\$75
SFOBB West Span Total	\$308
SFOBB West Approach	
Capital Outlay*	\$309
Capital Outlay Support	\$120
SFOBB West Approach Total	\$429
SFOBB East Span	
SFOBB Skyway	
Capital Outlay	\$1,293
Capital Outlay Support	\$197
SFOBB Skyway Subtotal	\$1,490
SFOBB SAS Foundation	
Capital Outlay	\$239
Capital Outlay Support	\$55
SFOBB SAS Foundation Subtotal	\$294
SFOBB SAS Superstructure	
Capital Outlay	\$1,682
Capital Outlay Support	\$202
SFOBB SAS Superstructure Subtotal	\$1,884
SFOBB East Span Others	
Capital Outlay	\$1,038
Capital Outlay Support	\$424
SFOBB East Span Others Subtotal	\$1,462
Capital Outlay*	\$4,252
Capital Outlay Support	\$878
SFOBB East Span Total	\$5,130
Other Completed Toll Seismic Retrofit Projects	
Capital Outlay Subtotal	\$6,025
Capital Outlay Support Subtotal	\$1,380
TBSRA Base Costs	\$7,405
Program Contingency	\$500 – \$900
TBSRA Program Total	\$7,905 – \$8,305

The forecast is based on award of the SFOBB East Span Self-Anchored Suspension in August 2004.

* The base for CO is the bid amount for awarded/on-going construction projects, or the engineer's estimate for projects in Design.
R/W Capital/Environmental Mitigation is included where noted.

04038g2

CONCLUSION

The results of the TBSRP cost review, as described earlier, support Caltrans' cost forecast of \$7.9 billion to \$8.3 billion for the total TBSRP.

While there are minor differences between Caltrans' cost forecast and this cost review for individual projects, the differences are customary due to the methodology used by two different teams to categorize and summarize cost components.

For reference, these differences are shown in Appendix 3.

APPENDIX 1

Schedule

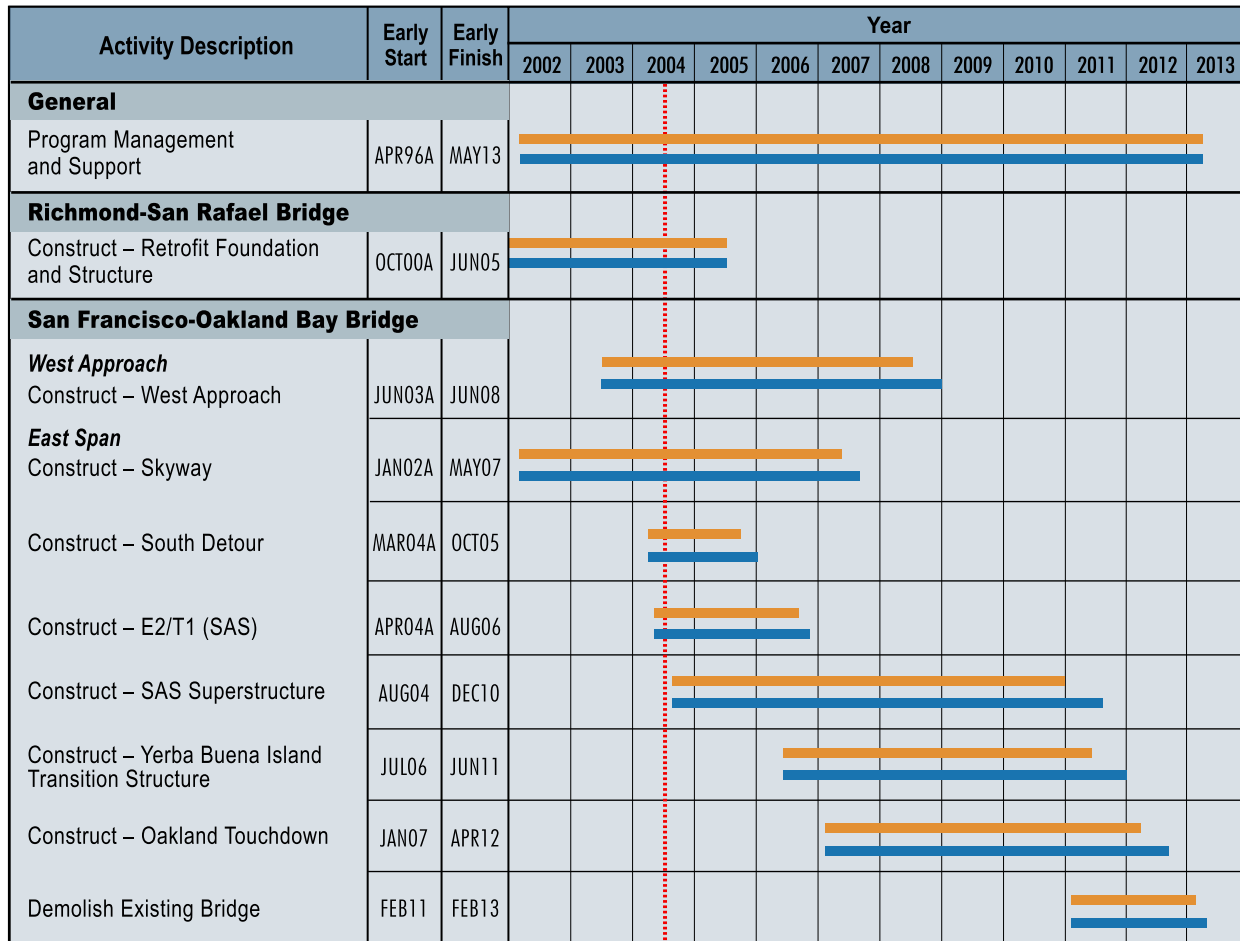
The schedule used as the basis for the cost review is illustrated below, and is reconstructed from the Caltrans May 28, 2004 SFOBB East Span Replacement schedule and other information provided by Caltrans. The schedule also shows cost review-related comments for the Richmond- San Rafael Bridge and SFOBB. Schedules for both of these bridges are based on the SAS superstructure contract awarded during August 2004. Delays associated with the contract award are discussed in Appendix 2, SAS Options Review.

Caltrans' current schedule – This is the current schedule based on information provided by Caltrans, and is used as the basis for the cost review. The schedule reflects an open-to-traffic date of June 2010 for the westbound roadway.

Cost review schedule – This schedule includes any schedule modifications believed to be necessary as a result of the cost review effort, and is consistent with the findings of the cost review. As such:

1. The schedule is based on the SAS superstructure contract awarded during August 2004.
2. Data provided by Caltrans reflecting previously completed contracts and their respective historical approved change orders for time extensions.
3. This study includes an average of 10 percent time extension to each SFOBB contract within the direct costs and is included in the cost review schedule bar chart that follows. The information on the chart reflects an open-to-traffic date of January 2011 for the westbound roadway.
4. Additional time extensions for schedule risks are not included in the bar chart below. These time extensions are included with the risk analysis that establishes various probabilities of confidence of achieving the construction durations and associated contingency costs. Schedule-related contingency is shown at approximately 60 percent and 80 percent confidence of achieving the specified durations.

Toll Bridge Seismic Retrofit Program: Comparison of Schedules for Cost Review Purposes



Legend: ■ Caltrans Current Schedule ■ Cost Review Schedule

04038g1

Note:

The cost review Schedule assumes that Caltrans will be able to advertise, award, and begin construction on project elements that have yet to be bid (Oakland Touchdown, YBI Transition structures, demolition) per the current Caltrans schedule.

APPENDIX 2

SAS Options Review

Section 1 – Introduction

In addition to performing a cost review of Caltrans' cost forecast of the Toll Bridge Seismic Retrofit Program (TBSRP), BATA requested that Bechtel review a series of Caltrans-developed program options for the Self-Anchored Suspension (SAS) structure. Caltrans developed these options as possible alternatives to the single bid received for the SAS contract, which exceeded the engineer's estimate. The single bid also exceeded existing funding levels for the bridge.

Caltrans' summary report of the bid options for award of the SAS contract is included as Attachment 1. The following provides an overview of Caltrans' options, along with Caltrans' schedule and cost impact assessments described in the report. Bechtel's review comments and associated basis are provided in Section 3.

Section 2 – Option Descriptions

Option 1 – Proceed with the Current Bidder

This option requires Caltrans to obtain the bid validity for an additional 60-day period from the single bidder and attain the additional funds from the California state legislature. In developing the option, Caltrans anticipated that the funding approval could be accomplished within the 2-month time period. Caltrans assessed that the Skyway and SAS foundation contracts would proceed to completion in accordance with their current schedules.

Schedule Impact – If these conditions can be achieved as stated, the time impact to the construction period would be a 2-month delay at the start and a corresponding 2-month delay at completion, compared to the current bid schedule of the east span opening in early 2011.

Cost Impact – This option is used as the "Base" for comparative purposes. Additional capital outlay and associated support costs are included in Caltrans' cost report for added funding, and hence no additional costs are assessed with this option.

Option 2.a – Re-advertise the SAS Contract in January 2005

Caltrans would develop conformed plans and specification and re-advertise the SAS contract in January 2005, with an expectation of receiving at least two bids. This option would take effect only if the required legislative funding approval is obtained during the current 2004 session and if Caltrans rejects the current bid.

Because of the limited time to rebid, the expectation is that the second potential bidder, who ultimately did not submit a bid in May, will bid, and that the single bidder will bid again. This option requires additional funding action from the legislature because Caltrans assumes that even with two bidders, the bid amount will exceed the currently authorized funds.

Schedule Impact – Caltrans does not anticipate a longer period for funding approval than that for the Base – Option 1, i.e., 2 months. Caltrans estimates that it will require 5 months to revise the contract documents and 8 months for the advertise/award/approve cycle (5 months to bid, including addenda and clarifications, 3 months to award/approve). The composite time impact of this option is anticipated at roughly a 1-year delay to the start of construction and a corresponding delay to the completion when compared to the current bid conditions. As with the base option, the Skyway and SAS foundation contracts would proceed to completion in accordance with their current schedule.

Under this option, the east span would be open to traffic in late 2011.

Cost Impact – Due to the noted schedule delays:

- The South-South Detour contract would be terminated and rebid at a later date to better align with the revised schedule and hence associated costs impact
- Delay of the SAS contract would incur escalation costs
- All future contracts would be rescheduled and incur escalation costs
- Capital Outlay Support (COS) for Caltrans would be increased due to the extension of contracts and rebid of the SAS contract

Caltrans' assessment of cost impact for this option shows essentially no cost savings from the Base – Option 1.

Option 2.b – Re-advertise the SAS Contract in September 2005

Caltrans would allow sufficient time to make appropriate changes in the plans, specifications and bid documents and re-advertise the SAS contract in September 2005 with the intent of attracting two or more bidders. Assumptions are that the legislature does not approve additional funding during the current 2004 session and that Caltrans would reject the single bid received. In this option, Caltrans would extensively revise the construction contract documents with the intent to attract two or more bidders. Caltrans would need to request additional funds from the legislature because the assumption is that even with multiple bidders, the bid amount will exceed the currently authorized funds.

Schedule Impact – Caltrans estimates that it will require 12 months to revise the contract documents, by which time the required legislative actions would be completed. Caltrans allows 8 months for the advertise/award/approve cycle.

As there is roughly a 20-month delay in the start of construction of the SAS structure, the east span would open to traffic in mid-2012.

Cost Impact – Due to the noted schedule delays:

- The South-South Detour contract would be terminated and rebid at a later date to better align with the revised schedule and hence associated costs impact
- Delay of the SAS contract would incur escalation costs
- All future contracts would be rescheduled and incur escalation costs for added time over that required under Option 2.a
- COS for Caltrans would be significantly increased over that of Option 2.a, due to the extension of contracts and rebid of the SAS contract

Caltrans' assessment of cost impact for this option shows a cost impact, on the high side, of \$200 million over the Base – Option 1.

Option 3 – Redesign SAS for a Cable-Stayed Bridge

This option evaluates the use of a cable-stayed bridge in lieu of the SAS structure and examines the impact on cost and schedule utilizing a design-build construction concept. Caltrans would develop performance specifications and design-build bid documents. To pursue this option, in addition to receiving the funding

increase authorization, Caltrans would need to secure a legislative authorization to proceed with a design-build concept. And for this design concept, Caltrans would need to pursue a public review and supplemental EIS/permitting process.

Schedule Impact – Caltrans anticipates it will require approximately 22 months of preliminary engineering to develop the bridge design to the level at which it can be advertised for a bid. During this period, the contract documents would also be prepared for a design-build contract. Caltrans allows an 18-month duration for the advertise/award/approve cycle, based on its experience on such major bridges.

In parallel, the legislation for additional funds would need to be approved and authorization received to pursue a design-build contract.

Because Caltrans has previously performed preliminary work on cable-stayed bridges, Caltrans anticipates that the public review and supplemental EIS/permitting process can commence within approximately 4 months after this option approval in September 2004. Based on its experience, Caltrans forecasts that it will require approximately 2 years for the public review/supplemental EIS and permitting. This public review and permitting activity is planned in parallel to preliminary design and bidding of the design-build contract.

Caltrans anticipates a net delay to completion of approximately 2 1/2 years beyond the base option for a mid-2013 open-to-traffic date for the east span. In addition, Caltrans recognizes a risk of up to 24 months in delays for the cable-stayed bridge completion if the permitting and approval duration reflects its experience on the SAS structure.

The east span would be open to traffic approximately mid-2013 excluding the delay risk of up to 24 months.

Cost Impact – Due to schedule delays and use of the cable-stayed bridge option, the increases in costs are as follows:

- The SAS pier E2/Tower T1 and South-South Detour contracts would be terminated
- The design-build contractor would build the new foundations
- The South-South detour contract would be rebid at a later date to better align with the revised schedule and hence associated costs impact
- The Skyway and YBI transition structures could require modifications
- Delay of the SAS contract would incur escalation costs

- All future contracts would be rescheduled and incur escalation costs for added time over the base option
- COS for Caltrans would be significantly increased over the base option, primarily due to:
 - Preliminary engineering for the cable-stayed bridge
 - Support of the public review and permitting process
 - Support for and during contract terminations, extensions, and rebids

A cable-stayed bridge, according to published costs, is less expensive to design and construct than the proposed SAS structure. In weighing the construction costs of the SAS and associated contracts under the current bid conditions against the design and construction of a cable-stayed bridge, plus the termination and delay costs for the other contracts and support, Caltrans concluded that either a cost saving (\$85 million) or a cost increase (\$110 million) are possible, depending on the costs of the bridge-completion-delay uncertainties.

Caltrans has assessed the uncertainties of related risk delays at 12 to 24 months. These uncertainties during the design stage are related to items such as earthquake assessment and foundations as well as interfaces between the structures, and during the permitting process for the time required to satisfy the public. Caltrans has estimated the cost of exposures for the delay uncertainties at up to \$200 million.

Section 3 – Bechtel Review Comments

Bechtel's review process, basis, and assumptions associated with Caltrans' report on the SAS options are outlined below. Bechtel review comments are included in three groups: Cost, Schedule, and Risk Assessment.

Review Process

1. Caltrans-developed schedules for Options 1, 2.a, 2.b, and 3 were reviewed based on Caltrans' experience on the seismic retrofit program. Caltrans' noted basis and assumptions were examined for reasonableness through comparisons with seismic retrofit historical data.
2. Direct capital costs developed by Caltrans were reviewed for reasonableness for each option based on the general basis and assumptions outlined below. Caltrans' cost assessments were primarily schedule driven for Option 2.a, 2.b, and 3 and hence escalation costs due to delay were critically reviewed for reasonableness, noting the assumption of 5% per annum escalation. In addition, the scope for Option 3 was considered to be very conceptual and hence cost reviews associated with the option were based on comparative reasonableness, using industry data for a conceptual estimate.

3. Caltrans-developed support costs were reviewed for added scope and schedule. The adjustments for Options 2.a and 2.b were primarily schedule driven and hence reasonableness checks were based on Caltrans' expenditure profiles for extension of time and added scope for modifications of contracts other than those for the SAS. For Option 3, the support costs also included allowances for preliminary design and rebid of contracts as well as public reviews and permitting costs. Order-of-magnitude checks were made for their relative reasonableness compared to other options and Caltrans' experience.

Basis and Assumptions:

1. As the option study was conducted within a limited time, scope and schedule impacts were evaluated based on Caltrans' experience. In some cases, Caltrans included cost allowances for scope items for which further details were not available.
2. In addition to Caltrans' notes on its cost and schedule presentations included with Attachment 1, other key assumptions include:
 - All of the data is assumed to utilize foreign steel fabrication and delivery to the site. If domestic steel is utilized, the costs may increase significantly (based on one bid for the SAS structure – in excess of \$200 million)
 - The escalation is included at 5% per annum. Current data (per July 2004 *Engineering News-Record* report) indicates that the steel and concrete prices are continuing to climb in the open market. However, such increases are not expected to continue at the current pace and hence a critical assumption.
 - Insurance and bond markets for construction contracts will not significantly deteriorate as they have had in the late 1990s.

Cost Review Comments

1. Bechtel's overall assessment is that the Caltrans-evaluated order of magnitude cost differences in Attachment 1 are reasonably representative of a relative order for the options under consideration. Costs for Option 3 can be improved for its relative order if better design and foundation conditions were available, but Caltrans' assessment for the given data appears appropriate.

2. Caltrans developed the costs in two groups: capital costs for construction and COS costs for services provided by Caltrans personnel and its consultants. These groupings lead to better evaluation of cost elements and consistency with Caltrans' budget monitoring systems.
3. For the re-advertise Options 2.a and 2.b, the differential costs were based on order-of-magnitude adjustments to the base option, as the costs were developed within a relatively short time frame. A critical assumption is that at least two bidders will participate. A follow-up strategy and associated plan needs to be implemented to ensure this outcome.
4. Overall costs for Option 3 were developed from conceptual pricing data and assumptions of reasonably conservative foundation conditions. If a legislative decision supports the required time, a more detailed assessment should be made. In addition, if legislative support is provided such that public hearing and permitting time is limited, Option 3 may be a path to investigate.

Schedule Comments

1. Caltrans' overall schedule comparison for the four options (1, 2.a, 2.b, and 3) appears reasonable and the ranking of options appropriate. Caltrans-experienced durations were properly utilized in development of the schedule options. The completion timing for each appears to be appropriate.
2. For Options 2.a and 2.b, funding authorization timing from the legislature will drive Caltrans' decisions. In addition, it is recommended that Caltrans seek guidance from its legal team to ensure that sufficient changes are made in the rebid package to avoid a lengthy lawsuit by the one bidder.
3. For Option 3, due to the lengthy front-end process of preliminary engineering for design-build bid for a cable-stayed bridge, it appears that if the design can be completed within an additional year over the base option time frame, the overall time period for design/bid-build would be the same as for bid/design-build. When there is no apparent time saving advantage for the bid/design-build option, the design/bid-build concept has the advantage of providing a firmer base on which to prepare an engineer's estimate at an earlier stage and possibly attract more bidders due to its conventional nature.

Risk Assessment Comments (Potential Variables)

Overall:

1. For all options, escalation rates of 5% per annum do not hold and labor and materials price increases are significantly higher than planned. This scenario appears to favor earlier commitments by contractors. However, the assumed 5% per annum escalation appears unlikely to be exceeded. One

option would be to index key materials to remove the risk from bidders and thus expect removal of associated risk amounts from the bid.

2. Additional funding is not approved by the legislature until-2005. This circumstance would eliminate Option 1 and Option 2.a. It is critical to know the anticipated timing of the funding approval so that Caltrans may follow an efficient course of action.
3. Schedule delays may occur due to the bidder question-and-answer period prior to award. These delays would increase costs due to escalation and increased complexity with interfacing east span contract scope. Time management and associated actions will be critical.
4. Lawsuit by the current lone bidder for the SAS contract. A lawsuit could put the schedule for Options 2.a and 2.b in jeopardy. Caltrans may need additional resources in its budget to allow for support of such activities. Costs are likely to increase due to inflation and Caltrans may find itself once again with one bidder. This scenario is possible unless Caltrans obtains legal guidance to make appropriate, legally conservative, and justifiable changes to the bid documents.
5. It is recommended that a path forward be developed for all options and appropriate resources be deployed to ensure that timely decisions are made in order to ultimately save costs associated with time.

Option-Specific Comments:

1. **Option 1** – The lone bidder does not extend the bid. Appears unlikely.
2. **Options 2.a and 2.b** – Only one bidder responds. It is recommended that Caltrans work with the two bidders, as it has done for the SAS proposal, and ensure that the bidders’ “Terms and Conditions” requests can be accommodated without jeopardizing its contractual position.
3. **Options 2.a and 2.b** – It is possible, with a very low probability, that delays to the SAS contract and revisions to the contract documents will not attract any bidders. Caltrans may want to pursue a time-and-material option, which may be to its advantage in eliminating risks and bringing associated inclusions from proposals. A risk-to-reward concept that increases the possibility of reducing the contract fee could benefit Caltrans.
4. **Option 3** – Schedule risk is highest for permit/EIS/public review time. If legislative help is provided – by accelerating approval of the funding and design-build concept, and by reducing the permit/EIS time – this option may become attractive. If this option were to be followed, it is critical that its viability is established early enough to not cause significant delays to its start. It appears that Option 2.a and 2.b

would be followed first and then if the bids come in significantly higher or there is a sole bidder with a high bid, this option may become viable.

CONCLUSION

Overall, Bechtel finds Caltrans' cost ranges for the SAS options, though some based on conceptual data, to be in relative order. Additionally, Bechtel finds that Caltrans' comparative schedule analysis for each option appears reasonable based on Caltrans' assumptions and its historical seismic retrofit construction experience.

Caltrans' analysis indicates that if achieving seismic safety for the motoring public is the primary objective, awarding the current bid is the most effective option. Further, Caltrans' comparative evaluation indicates that there appears to be little opportunity for significant cost savings by rebidding the current design (Options 2.a and 2.b) or by redesigning the current project to a cable-stayed system bridge (Option 3). The review of Caltrans' comparative assessment of these options and associated assumptions indicates that Caltrans' conclusions are reasonable.

APPENDIX 3

Cost Review Forecast Comparison with Caltrans' Forecast (\$ Million)

	Caltrans Forecast July 2004	Cost Review Forecast July 2004
Richmond-San Rafael Bridge		
Capital Outlay*	\$780	\$820
Capital Outlay Support	\$134	\$135
Richmond-San Rafael Bridge Total	\$914	\$955
SFOBB West Span		
Capital Outlay	\$233	\$235
Capital Outlay Support	\$75	\$75
SFOBB West Span Total	\$308	\$310
SFOBB West Approach		
Capital Outlay*	\$309	\$305
Capital Outlay Support	\$120	\$130
SFOBB West Approach Total	\$429	\$435
SFOBB East Span		
SFOBB Skyway		
Capital Outlay	\$1,293	\$1,320
Capital Outlay Support	\$197	\$175
SFOBB Skyway Subtotal	\$1,490	\$1,495
SFOBB SAS Foundation		
Capital Outlay	\$239	\$270
Capital Outlay Support	\$55	\$40
SFOBB SAS Foundation Subtotal	\$294	\$310
SFOBB SAS Superstructure		
Capital Outlay	\$1,682	\$1,685
Capital Outlay Support	\$202	\$200
SFOBB SAS Superstructure Subtotal	\$1,884	\$1,885
SFOBB East Span Others		
Capital Outlay	\$1,038	\$955
Capital Outlay Support	\$424	\$420
SFOBB East Span Others Subtotal	\$1,462	\$1,375
Capital Outlay*	\$4,252	\$4,230
Capital Outlay Support	\$878	\$835
SFOBB East Span Total	\$5,130	\$5,065
Other Completed Toll Seismic Retrofit Projects	\$624	\$645
Capital Outlay Subtotal	\$6,025	\$6,060
Capital Outlay Support Subtotal	\$1,380	\$1,350
TBSRA Base Costs	\$7,405	\$7,410
Program Contingency	\$500 – \$900	\$500 – \$900
TBSRA Program Total	\$7,905 – \$8,305	\$7,910 – \$8,310

The forecast is based on award of the SFOBB East Span Self-Anchored Suspension in August 2004.

* The base for CO is the bid amount for awarded/on-going construction projects, or the engineer's estimate for projects in Design.
R/W Capital/Environmental Mitigation is included where noted.

04038g2a

ATTACHMENT 1

***ANALYSIS OF BID OPTIONS FOR AWARD OF
SELF ANCHORED SUSPENSION BRIDGE CONTRACT**

* As developed by Caltrans and has been concurred with by BATA/Bechtel

ATTACHMENT 1 (CONT'D)

SAS BID OPTIONS

- Award Current Contract
- Re-bid SAS Contract
- Redesign and Bid Cable Stay Bridge Design

ATTACHMENT 1 (CONT'D)

ANALYSIS OF SAS BID OPTIONS

Summary of Findings

- **Award Current Contract**
 - Fastest route to begin and complete project and achieve seismic safety
 - Will require current contractor agreement to extend bid beyond July 30
 - Award requires funding (urgency legislation)
- **Re-bid SAS with Revised Bid Provisions**
 - Will delay project completion by at least 1 year (optimal schedule Option 2a) to 1.5 years (Option 2b)
 - Cost could be reduced if there are multiple bidders; reductions off-set by added costs due to delays and escalation.
 - Would require revisions to current bid documents, would seek additional relief from “Buy America” requirements.
 - There are significant potential risks in re-bidding:
 - Current bidder does not resubmit bid
 - Costs could increase with a second bid, especially if there is no “Buy America” waiver or a single bidder
 - Materials costs could increase (steel, concrete, etc.)
 - Re-bid schedule could be delayed
 - Law suit from current bidder
 - Re-bid of SAS will require funding beyond committed levels.
- **Re-Design and Bid Design/Build Cable-Stayed Bridge Design**
 - Will delay project completion by at least 2-1/2 years (optimal schedule)
 - Construction costs would be reduced from SAS; reductions off-set by added costs due to delays, escalations and sunk costs due to current construction activities and termination of awarded contracts
 - Substantial risk in revising bridge design:
 - Substantial schedule impacts due to re-opening process for selecting design & environmental review, and permits
 - Design has not been completed for cable stay designs & seismic assessment has not been conducted
 - Design/build legislation required
 - Re-bid of different design will require funding beyond committed levels.
 - Proposed design/build process may take same amount of time as normal Caltrans design and bid process.

ATTACHMENT 1 (CONT'D)

CONSIDERATIONS/RECOMMENDATIONS

Decision Factors	Considered Action
If the primary value is proceeding with and completing project as expeditiously as possible	Award Current Contract
If there is a very high confidence level of achieving: <ul style="list-style-type: none"> - Waiver of "Buy America" requirements prior to re-bid - Two joint ventures willing to bid (competition) - Re-bid package is ready-to-go in mid September 2004 - Re-bid award can be made in mid 2005 	Re-Bid Current SAS
If there is certainty of achieving: <ul style="list-style-type: none"> - Control on schedule of Federal/State environmental and permitting process (FEIS reevaluation) - Control on schedule for bridge design selection process - Accomplish equivalent seismic performance as current - Design/build legislation is approved - Two joint ventures willing to bid (competition) 	Re-Design and Bid Alternative Bridge Design

ATTACHMENT 1 (CONT'D)

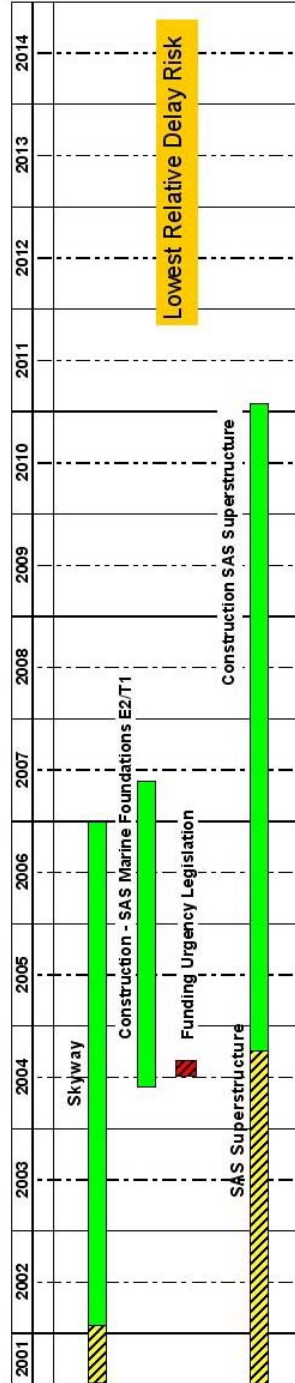
IMMEDIATE NEXT STEPS/FOLLOW-UP ACTIVITIES

Critical Actions	Schedule
Complete Finance Plan in 2004 Session	August 2004
Complete preparation of bid documents for re-bid of SAS contract with revisions	End of December 2004
Investigate relief from "Buy America" requirements <ul style="list-style-type: none"> - Review market capabilities to warrant waiver request - Request FHWA Waiver - Defederalize SAS/East Span project 	September 2004

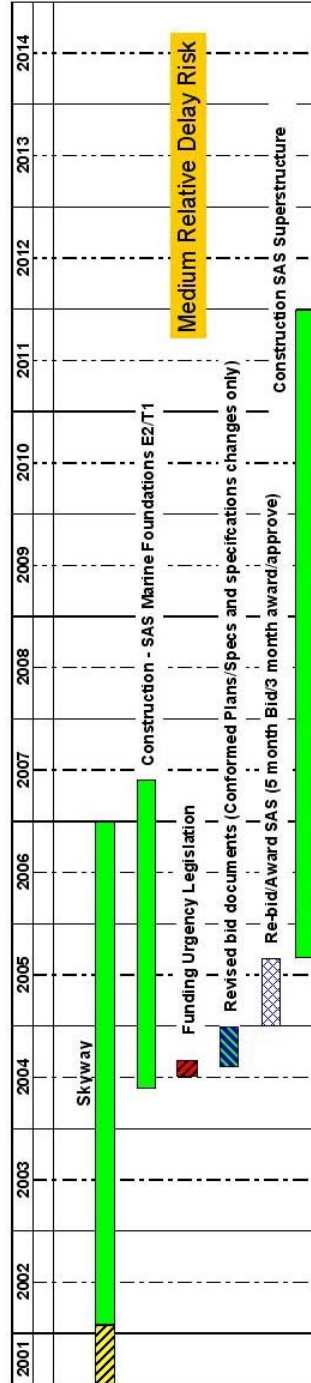
ATTACHMENT 1 (CONT'D)

Draft- Confidential
Self-Anchored Cable Suspension Bridge Design Option Schedules

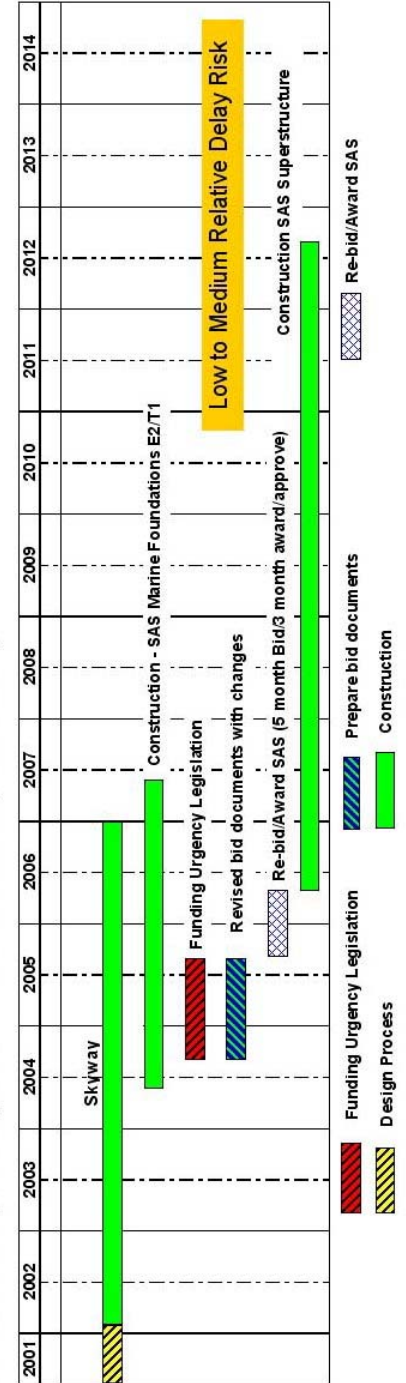
Current Forecast - Option 1 (Award Contract in September 2004)



Re-bid SAS - Option 2a Optimal schedule (Re-Advertise Contract in January 2005)



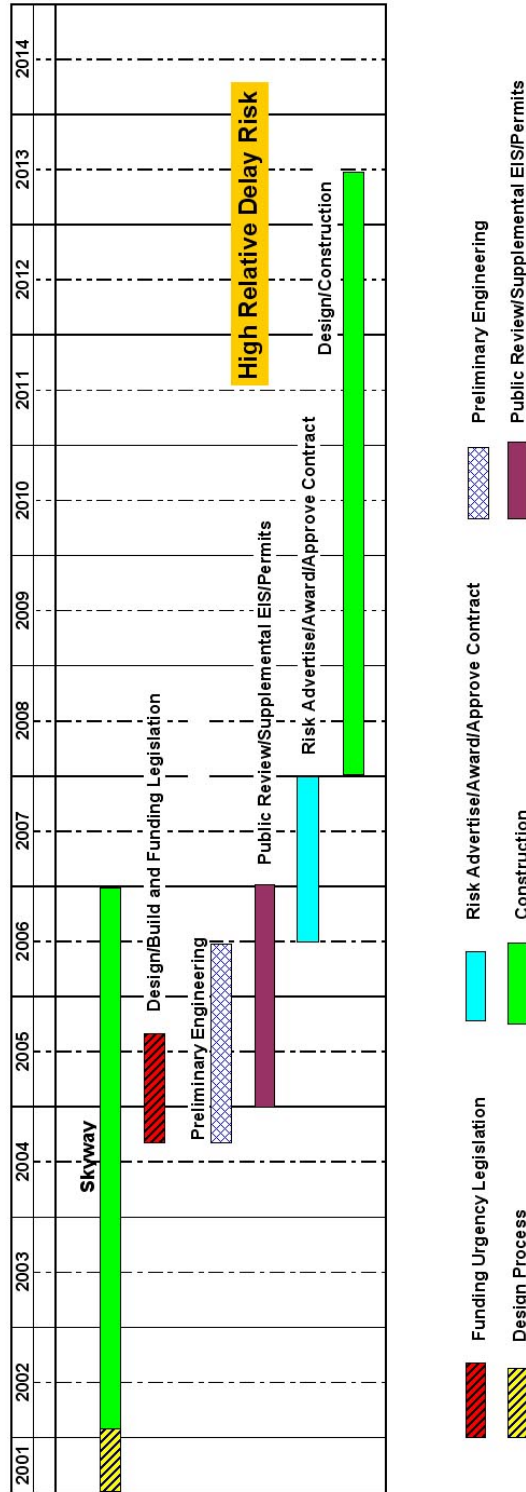
Re-bid SAS - Option 2b (Re-Advertise Contract in September 2005)



ATTACHMENT 1 (CONT'D)

Draft- Confidential
Self-Anchored Cable Suspension Bridge Design Option Schedules

Re-design SAS - Options 3 (Cable-Stayed Bridge Including Foundations/Design Build Contract)



ATTACHMENT 1 (CONT'D)

Draft-Confidential
Self-Anchored Cable Suspension Bridge Design Options

Options	Begin Construction	Potential Capital Cost Difference Subtotal (Millions)	Potential Additional Support and Delay Cost Subtotal (Millions)	Potential Additional Capital and Support Cost Total Change (Millions)	Environmental Document and Permit Issue Risk ⁽⁴⁾	Schedule Impact ⁽³⁾	Completion Schedule Risk ⁽²⁾
1. Bid Open and Award (Single Steel Tower, Cables, and Steel Deck) ^{(1) (8)}	Sept '04	0	0	0	None	Open 2010	Low
2. Re-Advertise Current SAS ^{(2) (3)} 2a & 2b	Sept '05 to May '06	-\$40 to +\$130	+\$40 to +\$70	\$0 to +\$200	Low	1-1.5 years Open 2012	Medium
3. Redesign SAS to Typical Cable-Stayed System ^{(6) (7)}	January '08	-\$220 to +\$30	+\$135 to +\$280	-\$85 to +\$310	High	2.5 to 4 yrs Open 2013 to 2014+	High

Notes:

1. SAS = SFOBB Self-Anchored Cable Suspension Bridge as currently designed and contract advertised (Bid Open May 26, 2004)
2. Assume two competitive bids are received, and the foreign-steel-based bid is chosen (25% less than domestic), otherwise add \$200M
3. Assuming Design/Build contract, urgency legislation is necessary to pursue design-build
4. Environmental document and permit risk based on federal, state, and local resource agency history on this project
5. Schedule risk is based on evaluation of scope revisions and the project development history of high public participation during type selection process.
6. Supplemental EIS assumed to take 2 years. Additional time (12 to 24 months) may be required due to need for regional consensus on new design.
7. Capital Cost to Redesign SAS Cable-Stayed System included cost for marine foundation.
8. Option 1 is baseline with capital and support costs as projected based on the current bid received.
9. Assumes 6 year construction duration for SAS bridge option and 5.5 year design/construction duration of design-build of cable-stayed option.